ARM8019
User's Manual

Beijing ART Technology Development Co., Ltd.

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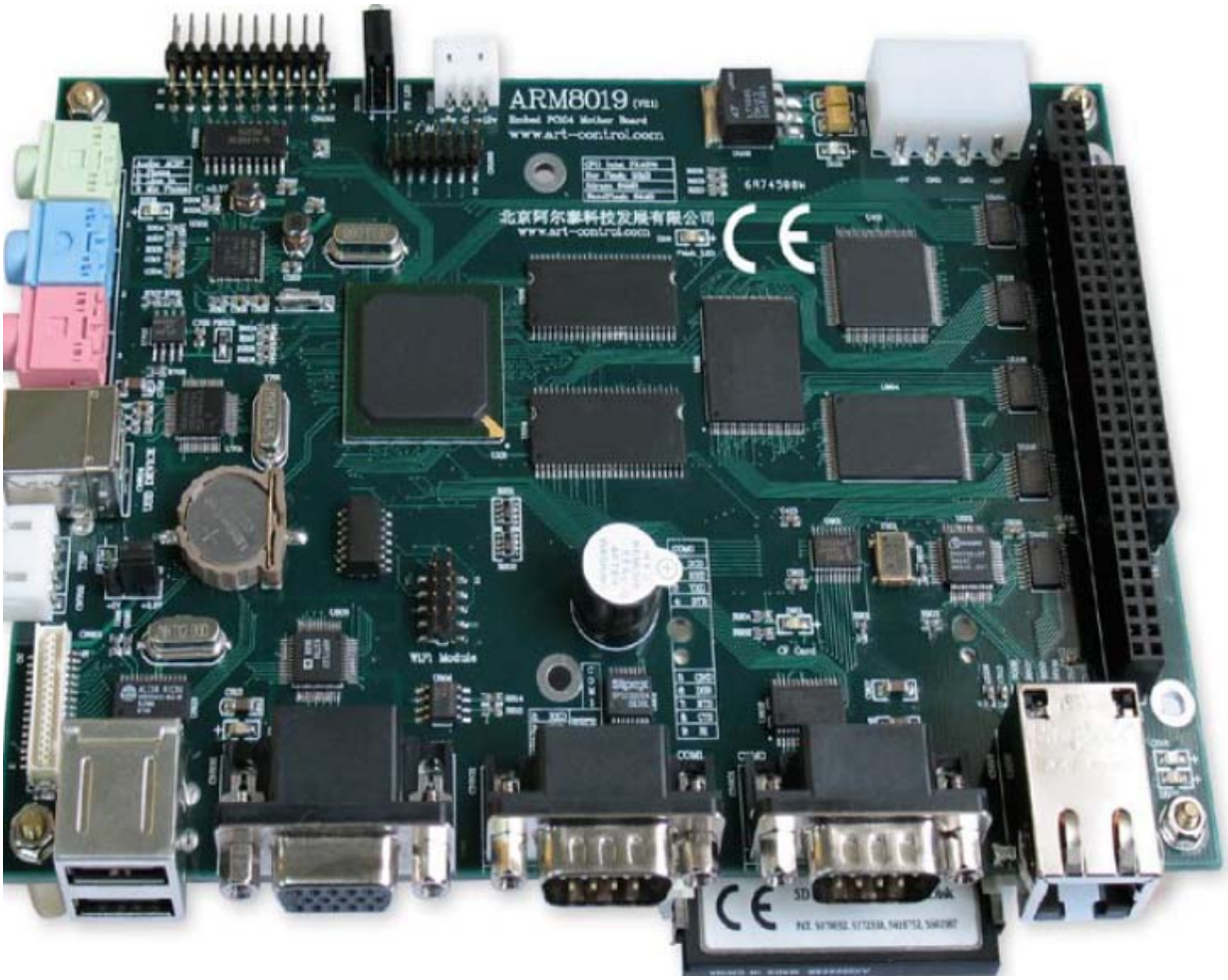
Chapter 1 Overview

ARM8019 is a kind of industrial mainboard which conform to PC104 Bus criterion designed by Beijing ART Technology Development Co., Ltd. CPU used Intel XScale series PXA270, Basic Frequency is could reach equal to 520Hz, the power consumption is only 5W, ARM8019 could process multi-Computing tasks by running Embedded Linux operation system or WinCE operation system.

ARM8019 uses embedded CPU with Ultra-low Power Consumption without fan control system, super-wide operating temperature -10°C ~+60°C, excellent performance on low temperature operating. Solving the problem of failure caused by the fan thoroughly on high working temperature. ARM8019 mainbaord possesses excellent features of high stability, low cost, low power consumption, which has an extensive application in industrial control Man-computer interface, web terminal, POS machine.



Hardware Features

- Mainboard Size: 165mm x 115mm x 20mm
- CPU: Intel XScale series PXA270

  Operating Frequency Range: 104MHz～520MHz

Basic Frequency: 520MHz
Power consumption: 750mW

- SDRAM: Industrial grade 64MB PC133 SDRAM
- Solid State Memory

NorFlash: 32MB (Intel StrataFlashMemory)

NandFlash: 256MB (Samsung NandFlash Memory)

CF Card: 256MB～1GB (TrueIDE Mode)

- Display System

Interface for LCD: Supports both DSTN and TFT Liquid Crystal Screen, the highest resolution is 80x600

Interface for VGA: Supports CRT Display with external VGA connector, the resolution is 800x600

- Audio System

Interface for AC97: Phone x 1, Line In x 1, MIC x 1

Interface for Touch Screen: Supports 4-line Resistance Touch Screen

- Communication Interface:

RS232 Serial port: 1x 3-line serial port, baud rate-- 921.6Kbps

Full-function Serial port: 1x9-line serial port, baud rate-- 921.6Kbps

Interface for RS485: 1xIndustrial Grade standard RS485

- USB HOST: 2x USB2.0, baud rate-- 12Mbps
- USB Client: 1x USB2.0, baud rate-- 12Mbps
- Ethernet: Ethernet Controller, Industrial Grade chip, 10M/100Mbps Self-adaptive, 1 x RJ-45 Ethernet port
- WLAN: 1 x Extension of wireless LAN card 802.11b/g (choice)
- PC104 Bus: Extended PC104 Bus
- Other Device:

1 x DC buzzer
2 x LED
RTC and Backup Battery
Independent Watchdog Timer
General- Purpose I/O, 8 cache digital input/output (5V)
JTAG Debug Interface

- Technics Characteristic

6 layer PCB Design, high stability, anti-interference

- Operation Temperature

Industrial Grade Operation Temperature: -10°C ~+60°C

Software Resource

ARM8019 embedded mainboard provides all function components driver， the specification of the software resource are as follows:

- PC104 Bus Driver
- NandFlash Driver(Identified as a disk on WinCE5.0 operating system)
- USB HOST Driver supports USB mouse, keyboard, USB flash device etc.
- USB Device Driver
- 10M/100M Base-T Ethernet Controller Driver
- WLAN Card Driver(choice)

- TFT/DSTN Liquid Crystal Screen Driver
- VGA Interface Driver
- AC97 Interface Driver
- Touch Screen Driver
- Full-function Serial Port Driver
- RS232 Driver, Standard Serial Port Driver
- RTC Driver
- CF Card Driver
- General- Purpose I/O Driver
- Buzzer Driver
- LED Driver

Preface

The<User's Manual> provides you the structural layout, component installation, setting and standard requirement of ARM8019Embedded Industrial-control mainboard. Users must read the <User's Manual> before you use the products to avoid any unexpected.

Proper Reader

The <User's Manual> is suitable for eligible technician but isn't appropriate the common readers.

Technical Terms

Technical terms in common use are as follows:

Technical terms	Specifications
CPU	Central processing unit
PC104	BUS criteria in industrial field
GB	Kilomegabytes (1,073,741,824)
MB	Megabytes (1,048,576)
KB	Kilobytes(1,024)
MHz	Megahertz(1,048，576)
Mbit	Megabits(1,048，576)
RISC	Reduced instruction set computer
ARM	Advanced RISC Machines

Product Statement

The <User's Manual> provides products information of Beijing ART Technology Development Co., Ltd. the document is not awarded any Intellectual Property permission and not indicate award any Intellectual Property permission. Beijing ART Technology Development Co., Ltd has no responsibility for anything except the products sales clause and product statement of the company. Besides, Beijing ART Technology Development Co., Ltd has no clear or implicit Guarantee about the sales or use of the products, including the feasibility of special use, salability, the tort liability of patent rights, copyrights and other Intellectual Property. The product of the Beijing ART Technology Development Co., Ltd does not design for Medical, life saving, the Beijing ART Technology Development Co., Ltd could make modification of the products at any moment and will not give notice.

There maybe have some design bug or errors of ARM8019 Embedded Industrial- control mainboard, which will be record into the corrigenda, so it has some difference with the former product, we will provide the new corrigenda if users ask for it.

Before you order the products, please contact with the local sales department to obtain the newest specification.

Users can obtain the document contains the order number and other technology documents on the company web:

http://www.art-control.com/englishs

Chapter 2 Product Summary

ARM8019 Embedded Industrial-control mainboard owns high performance, which structure and size are most compact. ARM8019 Embedded Industrial-control mainboard has PC104 bus interface and supports standard Extended PC104 Card.

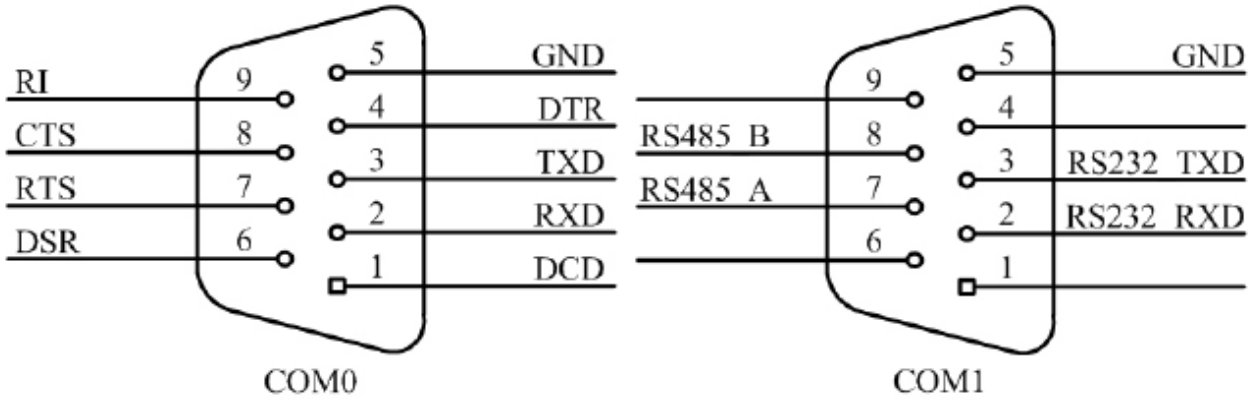
ARM8019 Embedded Industrial-control mainboard owns ARM controller framed by 32 bit RISC .This processor is provided with high performance, Basic Frequency is could reach equal to 520Hz, the power consumption is only 750mW, so the whole power consumption could equal to less than 5W, ARM8019 provides abundant interfaces, integrating the three serial ports, two USB main interfaces, one USB device interface, one AC'97,one LCD and Touch Screen interface, which makes peripheral design more simple, more reliable, the software and hardware cost lower.

VGA interface, which resolution could reach equal to 800 x 600 and could connect to the CRT display with the keyboard and mouse, which could make up of a industrial computer with low power consumption, Industrial grade serial port and 100M Base-T Ethernet Controller can easily connect to kinds of industrial control module. The PC104 extended socket is compatible with former control extended board, which can implement on the new system without any change.

Chapter 3 Interface Instruction

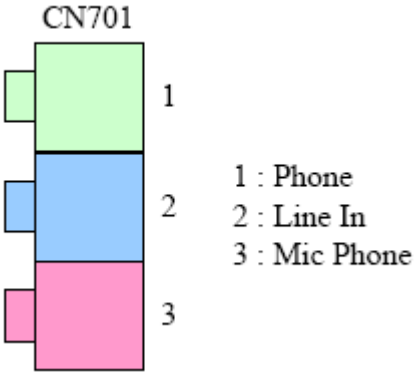
Power Sources: System power supply and liquid crystal screen inverter power supply output.

Serial port: COM 0 and COM 1.



Ethernet: Interface for 100M Ethernet.

Interface for USB: two USB main interface, one USB device interface; Interface for Audio Frequency: standard AC97 Audio Frequency interface.

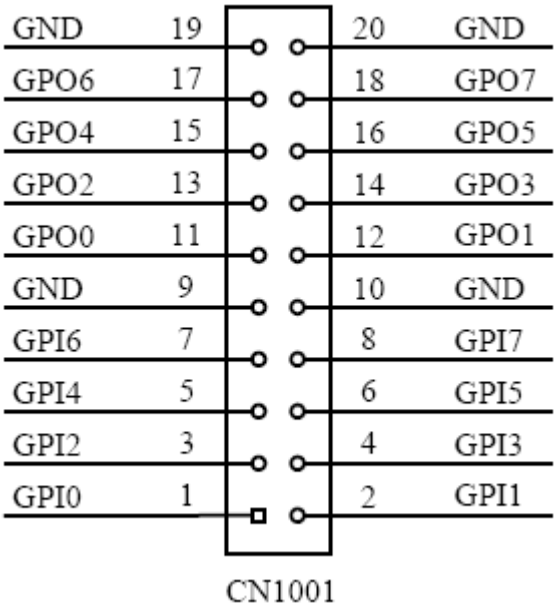


Interface for Liquid Crystal Screen: supports 31 chips TFT LCD module. (Such as: LQ104V1DG51, PD064VT5)

Interface for Touch Screen: supports 4-line Resistance Touch Screen;

Interface for WLAN Card: support WLAN Card module designed by ART company.

Interface for General- Purpose I/O: 8 Input/Output.



Interface for PC104 Bus: Using the External Bus of ARM CPU and programmable logic device could extend PC104 Bus, which supports standard PC104 Bus expansion board, the signal definition is as follows:

CN1101		
Pin	A Row	B Row
1	IOCHK	GND
2	D7	RESET
3	D6	VDD5V
4	D5	IRQ9
5	D4	NC
6	D3	NC
7	D2	NC
8	D1	SRDY
9	D0	+12V
10	IOCHRDY	NC
11	AEN	SMEMW
12	SA19	SMEMR
13	SA18	IOW
14	SA17	IOR
15	SA16	NC
16	SA15	NC
17	SA14	DACK1
18	SA13	DRQ1
19	SA12	NC
20	SA11	BCLK
21	SA10	IRQ7
22	SA9	IRQ6
23	SA8	IRQ5

24	SA7	IRQ4
25	SA6	IRQ3
26	SA5	NC
27	SA4	TC
28	SA3	BALE
29	SA2	VDD5V
30	SA1	OSC
31	SA0	GND
32	GND	GND

CN1101		
Pin	C Row	D Row
0	CND	GND
1	SBHE	MEMCS16
2	LA23	IOCS16
3	LA22	IRQ10
4	LA21	IRQ11
5	LA20	IRQ12
6	SA19	IRQ15
7	SA18	IRQ14
8	SA17	NC
9	MEMR	NC
10	MEMW	NC
11	D8	NC
12	D9	NC
13	D10	NC
14	D11	NC
15	D12	NC
16	D13	VDD5V
17	D14	MASTER
18	D15	GND
19	NC	GND

Chapter4 Electrical Specification

Limit Parameters

The following tables are the definition of the Limit Parameters of Electrical and Heating, those parameters will avoid the burnout of the ARM8019 Embedded Industrial-control mainboard.

Limit Parameters [1]

Symbol	Parameter	Conditions	Minimum value	typical value	Maximum value	Unit
VDD5V	working supply voltage of Mainboard		+4.85	-	+5.5	V
-5V	supply voltage of expansion board		none	-	无	V
+12V	supply voltage of expansion board		+12.45	-	+11.75	V
-12V	supply voltage of expansion board		none	-	none	V
VCC	operating voltage of CPU I/O		+2.7	-	+3.3	V
T_{stg}	storage temperature【2】	Industrial products	-40	-	+105	° C
P_{tot}	Power consumption of whole mainboard【3】	No Liquid Crystal Screen	2.5	-	5.0	W

[1] The specifications of Limit Parameters are as follows:

1) There has Inner protection circuit of the product interface, do not use the parameters overstep the utmost operation parameter, avoiding the burnout of the chip or the board.

2) It is valid to operate the parameters in the scope of the operating temperature.

[2] Depending on product grade.

[3] System running normally, not in the low-power or dormant state.

Static Characteristic

Symbol	Parameter	Conditions	Minimum value	typical value	Maximum value	Unit
V_{IH}	Input High Volt		0.8VCC	-	VCC+0.1	V
V_{IL}	Input Low Volt		VSS-0.1	-	0.2VCC	V
V_{OH}	Output High Volt	I_{OH} = -4mA	VCC-0.3	-	VCC	V
V_{OL}	Output High Volt	I_{OL} = -4mA	VSS	-	VSS+0.3	V

EMC Design

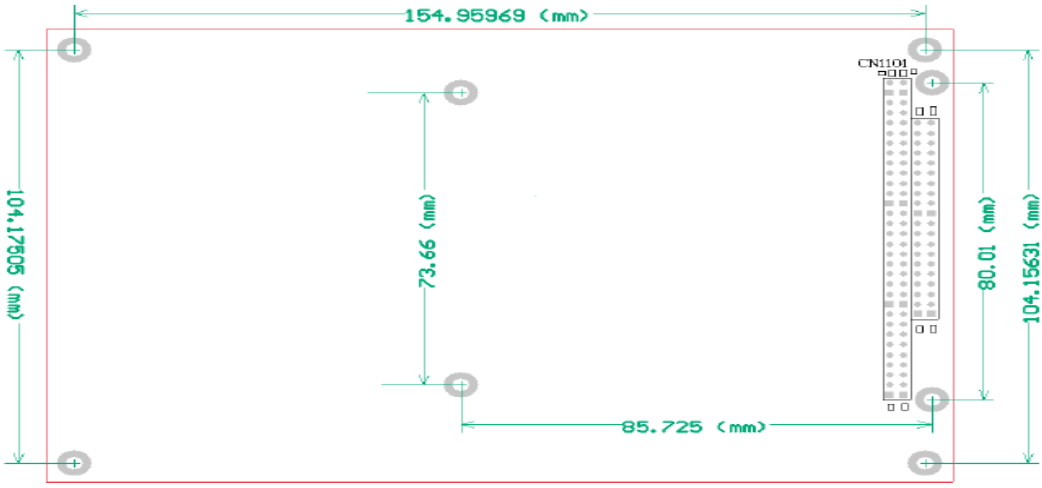
When ARM8019 embedded mainboard is used in industrial level electromagnetism environment, power supply module of mainboard must be carefully designed. Suggested that use power supply noise filter (case TDK ZUB2203H-L), proper varistor, TVS pipe, etc. In special application there may need porous magnetic beads

clustered to segregate power grid high harmonic interference. Besides, there are some other design points which should be pay attention to:

In EMC test suggested high voltage capacitance is 1.5KV~2.0KV.

Device should be with good earth character and earth is separated from power well.

Mechanical Character



Inspect and Maintenance

In use of MB270A embedded industrial mainboard, most electric components are semiconductor element, although they could work for a long time, but incorrect environment may accelerate them aging. It should be inspected regularly so keep it in required condition. Suggested interval is six to twelve months once at least. In bad environment it should be inspected more. If there are some problems in maintenance, please read content below to make sure where it is. If problem is still there, please contact us.

Number	Content	Inspect	Standard	Action
1	Power Supply	Check power wave at power source	Voltage must be in allowed range: +5V DC,-5V DC +12V DC,-12V DC	Using voltmeter to check input power voltage, take necessary action to keep input voltage in allowed range
2	Working Environment	Check working temperature (including inner temperature)	-40°C~ +85°C	Using thermometer to check temperature and keep it in allowed range
		Check working humidity (including inner humidity)	With no airconditioner, Relative humidity is: 10% ~ 90%	Using hygrometer to check humidity and keep it in allowed range
		Check accumulation of dust, powder, Salt, metal scrape	No accumulation	Clean and protect device
		Check whether water, oil or chemical spray contacts device	No spray contacts device	If necessary, clean and protect
		Check easy corrosion and easy burning gas in working environment	No easy corrosion and easy burning gas	By smelling or sensor
		Check tremble and strike level	In specific range	If necessary, install pad and other damping set
		Check noise resource around	No big noise resource	Segregate noise resource from device or protect it
3	Installation And Connection	Check connection of every unit and safe locked with next unit	No loose	Press connector together completely and use slip block to lock them
		Check cable connector inserted fully and locked	No loose	Correct any wrong linked connector
		Check whether there is loose screw in exterior connection	No loose	Using screw driver to screw down it
		Check crimp connector of exterior connection	There is enough space between connector	Eyes check if necessary to adjust
		Check damage of exterior cable	No damage	Eyes check if necessary to replace

Chapter 5 Important Safety Instructions

Electrical Safety Instructions

- In order to forbid damage, before moving mainboard, please cut off the power of the mainboard.
- Whether add hardware devices to system or move out hardware devices from system, please must first connect hardware devices' signal line, and then connect the power cord.
- Make sure power supply has been adjusted to the standard voltage.
- It mustn't cut off power during the start-up, or it may damage NANDFLASH.

Operation Safety Instructions

- Please read these safety instructions carefully.
- Please read and follow all instructions in the documentation before installing the mainboard and hardware devices.
- Before using ARM8019, please make sure all the plat cables and power cord have been connected rightly. Check for any damage, if it is damaged, please contact us or notify the local dealer or sales for a replacement or repair.
- In order to avoid electric short circuit, please take back all unwanted snails, clips and other components from the mainboard.
- Mainboard life time can be affected by dust, humidity and exquisite temperature change, so we should put it away from these places.
- Please contact technical support staff when you have any problem in technology.
- When the system is in the process of being start-up, keep the electric power supply. Or else, the NOR FLASH might be damaged.